PRACTICE EXAM 6 - MATH 140
DATE: Friday, December 1
INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. Each question is worth 5 points. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. (a) Find the exact value of the expression $\csc\left(\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)\right)$. (1 point)

   (b) Find the exact value of the expression $\sec\left(\sin^{-1}\left(\frac{2\sqrt{5}}{5}\right)\right)$. (2 points)

   (c) Find the exact value of the expression $\sin\left(\tan^{-1}\left(\frac{1}{2}\right)\right)$. (2 points)

2. (a) Establish the identity $\frac{\cot\theta}{1-\tan\theta} + \frac{\tan\theta}{1-\cot\theta} = 1 + \tan\theta + \cot\theta$. (2.5 points)

   (b) Establish the identity $\frac{\cos^2\theta - \sin^2\theta}{1 - \tan^2\theta} = \cos^2\theta$. (2.5 points)

3. (a) Suppose $\alpha = \sin^{-1}\frac{4}{7}$ Find $\sin\alpha$ and $\cos\alpha$. (1 point).

   (b) Suppose $\beta = \tan^{-1}\left(-\frac{5}{12}\right)$. Find $\sin\beta$ and $\cos\beta$. (2 points)

   (c) Find $\sin(\alpha - \beta)$. (2 points)

4. Compute $\cos\left(\tan^{-1}\frac{3}{4} + \sin^{-1}\left(-\frac{12}{13}\right)\right)$. I want to see **all** the details **neatly written** down. (5 points).

5. Solve each equation in the interval $0 \le \theta < 2\pi$.

   (a) $\cos(2\theta) + 6\sin^2\theta = 4$ (3 points)

   (b) $\sec\theta = \tan\theta + \cot\theta$. (2 points)